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HANDLING AND STORING SMALL LOTS OF DATES AT HOME

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INTRODUCTION

Throughout the arid Southwest where dates can be grown many people who live outside of the commercial date-producing centers have a few bearing date palms and wish to store the fruit for home use. Regardless of the size of the crop the handling of harvested dates may require several different operations, such as ripening, conditioning for keeping quality, cleaning, and the control of insect infestation. In this circular the principles involved in handling and storing a crop of dates are discussed and methods are given for the handling of small lots of fruit. For a discussion of the commercial handling of Deglet Noor dates, reference should be made to Technical Bulletin 193.²

TYPES OF DATES AND COMMON VARIETIES

Dates are classified as "soft," "semidry," and "dry," depending on the softness of the ripe fruit. Another classification is according to the kind of sugar contained in the ripe fruit, "invert-sugar dates" containing mostly dextrose and glucose, and "cane-sugar dates" containing mostly cane sugar (sucrose).

¹ The data on mineral and vitamin content incorporated in the section "Food Value" were contributed by Georgian Adams, associate food chemist, Bureau of Home Economics.

² U. S. Department of Agriculture Technical Bulletin 193, Experiments on the Processing and Storing of Deglet Noor Dates in California, is obtainable from the Superintendent of Documents, Washington, D. C., at 15 cents per copy.

Most soft varieties are invert-sugar dates and most dry varieties are cane-sugar dates; some semidry varieties contain mostly invert sugar and others cane sugar.

The common soft varieties include Khadrawy, Maktoom, Hayany, Dayri, Barhee, Braim, Kustawy, and Rhars, all of which are invert-sugar dates.

The common dry or "bread" varieties are the Thoory and Kenta, both of which are cane-sugar dates.

The common semidry varieties include Deglet Noor, Halawy, Saidy, Zahidi, and Sayer. The Deglet Noor is a cane-sugar date, whereas the other semidry varieties are invert-sugar dates.³

The dry varieties usually contain only a little moisture when ripe and are nonperishable, whereas the soft and semidry varieties contain a considerable amount of moisture and are usually highly perishable if they are not dried by either natural or artificial means.

GRADING

Dates are separated into lots of uniform ripeness in order to simplify handling during the ripening and curing processes.

Arabic terms, "khalal," "rutab," and "tamar" are found in the date literature and are used to describe three stages of ripeness.

Dates are in the khalal stage when the green color of the full-grown fruit turns to yellow or shades of red characteristic of the variety. Dates are in the rutab stage from the time the ripe color starts to appear and the



FIGURE 1.—A date-grading table made at the Government Date Garden, Indio, Calif. Note the slatted center section to allow trash to drop through and funnels at one end leading to boxes below.

³ Description of the fruit of many varieties of dates is found in Arizona Experiment Station Bulletin 149, *Date Growing in Arizona*, obtainable from the University of Arizona, Tucson, Ariz., and also in U. S. Department of Agriculture Circular 300, *The Dairree Date*, for sale by the Superintendent of Documents, Washington, D. C., at 5 cents per copy, and in the U. S. Department of Agriculture Leaflet 170, *Date Growing*.

flesh starts to soften until softening is complete and partial drying has occurred. Tamar dates are those that have dried out or cured enough to keep without spoiling.

The rutab stage covers a wide range of maturity, including partly ripe fruits that need to be both ripened and cured before packing, and ripe fruits that may need only a small amount of drying or curing in order to keep without spoiling. Within the rutab stage of maturity there may be dates that are of excellent eating quality but very perishable; these are fully ripe and soft but not dry enough to be classed as cured fruit. Such dates are often called soft-ripe or noncured fruit.

To make easier the handling of the different grades of dates, the fruit is separated into groups according to maturity. A small grading table built at the Government Date Garden, Indio, Calif., is

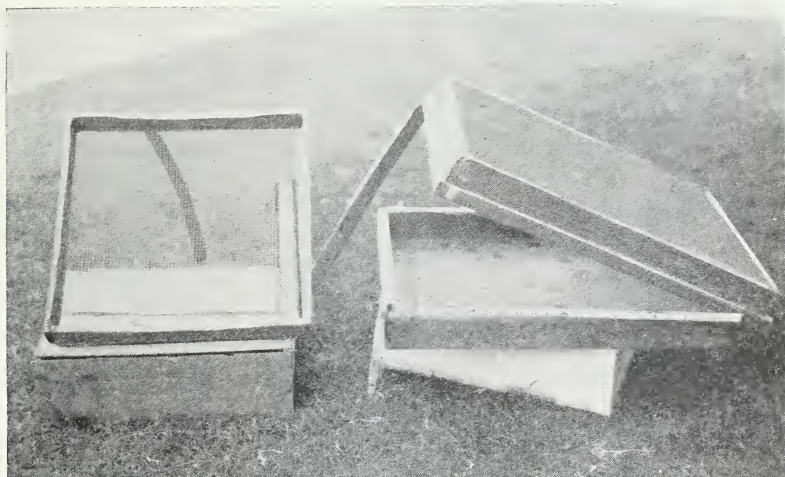


FIGURE 2.—Trays for ripening and curing dates. Left, a wire-bottom tray for use in rooms and cabinets; right, a solid-bottom tray with cover of 30-mesh screen that is practically insectproof.

shown in figure 1. The grader places the soft fruit on trays whereas the firm grades can be fed to the boxes below through the funnels at the end of the table.

Two types of date trays are shown in figure 2. The shallow, wire-bottom tray about 18 inches square is very convenient for ripening and curing dates in rooms and in cabinets. The solid-bottom tray with a lid of 30-mesh screen is practically insectproof and can be used for ripening and curing dates out of doors.

CHANGES DURING RIPENING

Dates ripen during the late summer and early fall. While in a green state they are firm, smooth, crisp, and astringent. They attain full size and nearly full sugar content before the green color changes to the yellow or reddish color that is characteristic of the different

varieties when ripening begins. The ripe color usually appears first at the tip of the fruit and spreads gradually to the shoulder or calyx end. As ripening continues the characteristic ripe color darkens, becoming hazel brown with Deglet Noor dates, dark brown with Khadrawy, reddish brown with Saidy, and brownish purple or nearly black with Hayany.

Except in dry varieties the change in color is accompanied by a softening of the flesh, which starts near the skin at the tip and progresses toward the seed and toward the shoulder. The soft flesh

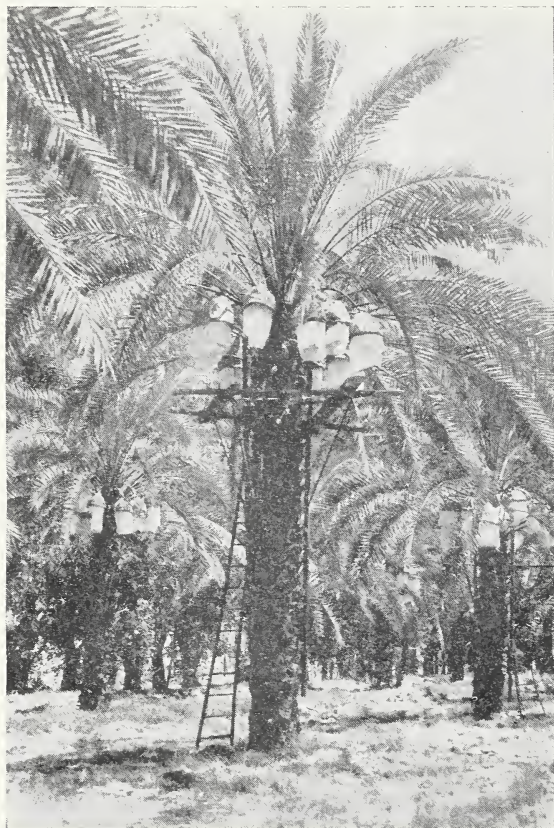


FIGURE 3.—Combination paper-and-cloth cover on date bunches for protection from rain and pests. The cloth can be tied at the bottom to catch dropping fruit.

changes in consistency, becoming translucent or semi-transparent, and it also shrinks somewhat. The shrinking of the flesh causes the skin to wrinkle. Astringency disappears as the softening of the flesh progresses. In some varieties, notably Barhee and Braim, astringency is lost very early, making the fruits edible in a fairly firm and crisp condition. In all varieties astringency usually disappears before the entire flesh is soft and translucent, which accounts for the wide variation in the amount of rag, or unsoftened flesh, found in edible dates.

Khalal fruit of soft and semidry varieties contains a large quantity of moisture, amounting in some varieties to more than half the

total weight. As ripening continues moisture is slowly lost by evaporation. This natural process of drying out of the flesh is called curing. It usually starts before the fruit is picked and is allowed to continue after harvest until the moisture content is reduced to a point where the fruit will keep without souring or molding.

HARVESTING

While dates are turning ripe—a period which may last for 4 to 6 weeks before all the fruits of a single bunch are ready to pick—the bunches may be covered with paper and cloth in order to protect the fruit from rain, birds, and insects. The cheesecloth or shade cloth⁴ cover when closed at the bottom also affords a means of catching the ripe fruit that drops between pickings. Figure 3 shows combination paper-and-cloth covers on bunches of dates.

Although most varieties can be picked in the khalal stage and ripened after harvest, the best quality is obtained by allowing the dates to ripen on the palm. Some advantages of picking khalal fruit are ease of cleaning because of firmness and smoothness at this stage, freedom from insect infestation, and reduction of the possibility of the crop being damaged by rain. These advantages, however, are of more importance to the commercial grower than to the owner of a few palms. Except at a time of threatening rain, or whenever cold weather stops the normal ripening of the fruit, the owner of a few palms should allow the fruit to ripen to the extent that it is partly or fully cured before picking and thus save himself the trouble of ripening and curing the fruit artificially.

During a normal ripening season the dates of a single bunch, which may number as many as several hundred fruits, ripen a few at a time. Fruits of the highest quality are obtained by picking each day the dates that have reached a prime condition of ripeness and proper degree of curing. Some varieties of dates do not drop readily and are picked commercially at intervals of a week to 10 days. Under this method the harvest at each picking will include

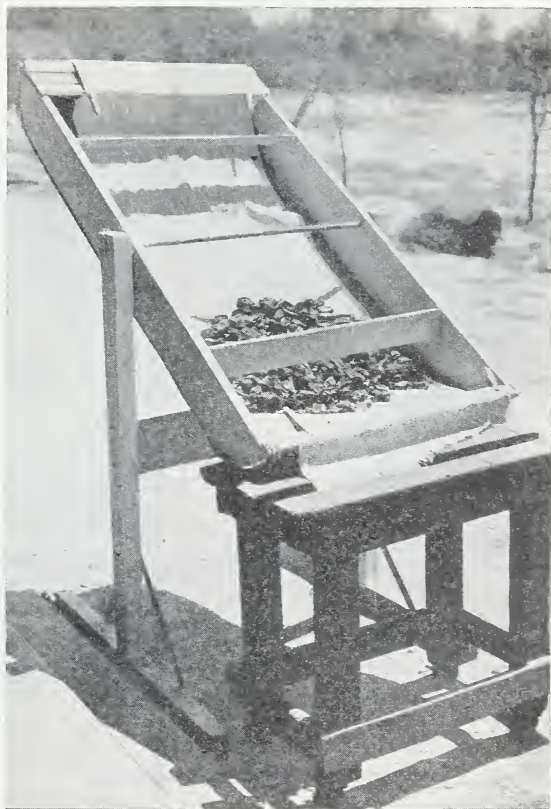


FIGURE 4.—A date cleaner that can be made at home. Note arrangement of toweling on the cradle.

⁴ Shade cloth is a lightweight fabric of somewhat finer weave than cheesecloth.

dates of all stages of maturity from partly ripe to ripe, dried-up fruit. However, the Saidy variety is notorious for its readiness to drop, both in the khalal and early ripening stages. It also loosens at the button and is subject to more or less severe insect infestation. Therefore with this variety frequent picking is desirable.

A novel method of harvesting part of a small crop consists of cutting off an entire bunch near the trunk of the palm after a few fruits have ripened. If the cut end of the fruit stalk is kept in water many of the dates will ripen normally.

CLEANING

Dates should be cleaned at least twice to remove adhering dust. The first cleaning is given immediately after picking, in order to make grading easier, and a final one is given before the fruit is packed. Cleaning can be done by rolling the dates back and forth over damp toweling. A date cleaner using this principle is shown in figure 4. It consists of a cradle made with wooden sides and canvas bottom to hold the toweling. Soft dates are sometimes sprayed with water to clean them, but after this treatment they must be spread out upon trays and dried as soon as possible to prevent souring.

ARTIFICIAL RIPENING

Dates continue to ripen after harvest so long as they do not dry out too rapidly. Ripening is accelerated by heat. Temperatures between 90° and 120° F. are generally used. Nearly ripe fruit can be ripened in a few days at a temperature of 90° to 95°, whereas more immature fruit may require a temperature of 110° to 120°. As prolonged exposure to high temperature is likely to make the fruit sirupy and dark colored, these temperatures are used only until softening of the flesh becomes well started, after which 90° to 95° is used to complete the ripening process. High humidity is necessary whenever a ripening temperature of 110° to 120° is used; it is also necessary at lower ripening temperatures during the time required for partly ripe fruit to become nearly ripe. Nearly ripe fruit will continue to ripen under the normal humidity prevailing in date-producing areas when the ripening temperature is held below 100°. As soon as the flesh near the seed becomes soft the fruit is placed under conditions to accelerate the drying out of the flesh. (See discussion on the drying of dates, p. 7.) Soft flesh is readily determined by squeezing the date gently at the shoulder or by looking through it toward a strong light. The unsoftened flesh or rag will feel firm by the pressure test and will appear dark by the light test.

EQUIPMENT FOR RIPENING

Growers who have several hundred pounds of dates to ripen at one time generally stack the trays of fruit in a small cabinet or closet that can be heated if necessary. A uniform ripening temperature is desirable but not absolutely necessary. Fluctuating temperatures prevailing in nonheated cabinets, reaching low points at night and optimum ripening temperatures during the daytime, do not stop

the ripening process within the dates but merely retard it. Humidity can be increased in ripening cabinets by placing wet sacks near the fruit or by occasionally adding water to the air by using a "fly-spray" gun.

Figure 5 shows a metal can in use as a ripening cabinet for small quantities of dates. By placing it in the sunlight with lid in place, a temperature can be obtained inside that may be as much as 30° F. higher than that of the surrounding air. A small ripening cabinet having a glass top to admit solar heat is described in a circular issued by the University of Arizona Extension Service.⁵

Nearly ripe fruit can be ripened in the sunlight without the use of cabinets by using a covered tray (fig. 2) or by covering the fruit with shade cloth to exclude insects.

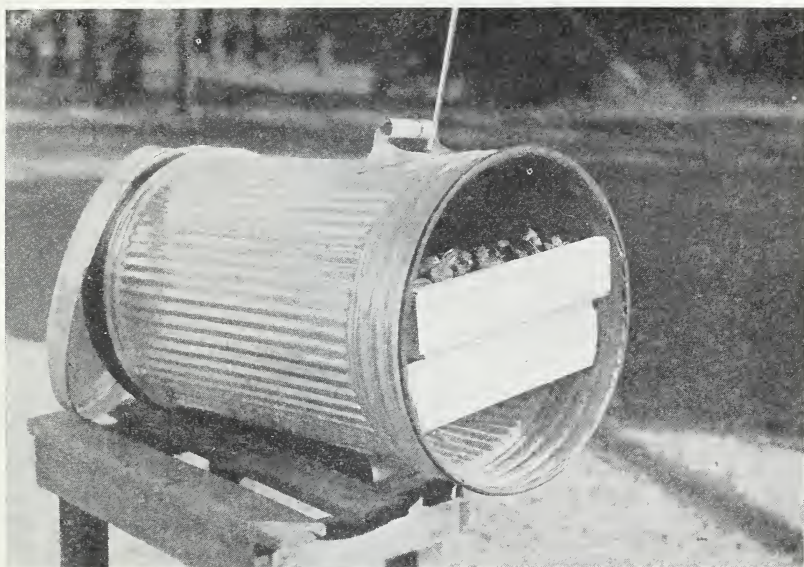


FIGURE 5.—A metal can may be used as a ripening cabinet for small lots of dates.

CURING

After most of the flesh of the date becomes soft, rapid drying without excessive heat is essential for obtaining high dessert quality and good keeping quality. High temperature at this time produces dark color and sirup. The drying or curing process consists of allowing the fruit to dry out until the soft flesh becomes pliable to the touch but not tough. This process concentrates the sugar and prevents molding and souring.

Dates are cured on shallow trays in rooms where air can circulate freely around each tray, or out of doors in trays covered with shade cloth or fine-mesh screen.

⁵ University of Arizona Extension Service Circular 79, The Home Curing of Fresh Dates in Arizona, available from the University at Tucson, Ariz.

INSECT CONTROL⁶

Dates attract small beetles, chiefly the dried fruit beetle, and moths, including the raisin moth and the Indian-meal moth. These insects lay eggs on the fruit and the eggs hatch into larvae or worms, which feed on the pulp. They frequently enter the seed cavity. Fallen dates on moist soil breed insects in great numbers, consequently the avoidance of such accumulations will be of direct benefit by reducing the insect population.

Fumigation, if properly carried out, may be depended on to kill all insects and their eggs in and on dates.

Certain fumigants, of which ethylene dichloride - carbon tetrachloride mixture is one, cause many of the insects to leave the interior of fruit. The heat of the sun has this same effect. Fumigation just before the fruit is ready to pack into tight containers minimizes the possibility of reinfestation.

Airtight rooms with a closable vent opposite the door are used for the fumigation of large lots of fruit. For lots up to 400 or 500 pounds a tight cabinet about 3 feet square and 4 feet high with a lid for the top can be made of plywood. Old refrigerators have been converted into fumigating cabinets by plugging the drain. The ripening cabinet, if set upright as



FIGURE 6.—Metal can as used for fumigating small lots of dates.

shown in figure 6, can be used as a fumigator holding about 50 pounds of dates. A gasket made of friction tape is put on the rim of the can to make the lid fit tightly. The fumigant is placed in a cup or poured on a thick pad of toweling above the trays or boxes of dates

⁶ This section has been prepared in collaboration with the Fresno Field Station Fruit Insect Investigations, Bureau of Entomology and Plant Quarantine. More detailed information on fumigants and fumigation methods may be obtained from the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.

and the fumes, which are heavier than air, are held effectively in the relatively deep fumigator.

A mixture of ethylene dichloride and carbon tetrachloride (3 parts to 1) is a noninflammable liquid fumigant obtainable in small quantities. The recommended dosage is two-tenths of a fluid ounce or slightly less than 2 teaspoonfuls per cubic foot of fumigator space, and the fumigating time is 12 to 18 hours.

Carbon tetrachloride is not used alone as a commercial fumigant, but preliminary tests indicate that small lots of dates can be fumigated with this material, which is obtainable at drug stores, if the treatment is carried on at a temperature above 90° F. with a dosage of 1 to 2 fluid ounces per cubic foot of fumigation space. In tests with this material the metal-can fumigator (fig. 6), that has a capacity of about 2 cubic feet, was placed in the sunlight and the fruit held in it throughout the warm part of 2 days, 2 fluid ounces of carbon tetrachloride being applied at the start and a second dose of the same amount being added on the morning of the second day. Although the extent of the killing of eggs was not determined, it was found that larvae were killed. The time required and the quantity of this material used make it impracticable for large lots of dates, but there is often need for an easily obtainable, relatively safe, non-inflammable fumigant for small lots.

The use of heat to kill date insects and their eggs is discussed in the University of Arizona Extension Circular 79.⁷ This circular recommends keeping the fruit 1 to 1½ hours in a sun-heated cabinet in which a temperature of about 150° F. is maintained or in the oven of a kitchen range maintained at this same temperature.

In an oven at 250° F. dates were heated to 140° in 1 hour when held in 1-pound coffee cans and to the same temperature in 1¼ hours when held in 2-pound cans.

The use of heat for insect control is likely to make the fruit dark and slightly sirupy and to destroy the delicate flavor of some varieties. However, for small quantities of fruit this method is in some cases more convenient than fumigation.

PACKAGES FOR HOME USE

Fully cured dates are dry enough to keep without spoiling and can be packed in tight containers such as glass jars and coffee cans. These containers are insectproof and keep the fruit pliable by preventing further drying.

Uncured dates are perishable because of their high moisture content and will sour and mold if not held under refrigeration. If it is desired to hold such dates they should be packed in well-ventilated containers to facilitate drying. Shallow jars or cans without lids, and berry baskets, provide ventilation but do not protect the fruit from insects. Cloth covers for jars and cans and paper or cloth bags for holding baskets of fruit can be used to keep insects away. A bag can be made insectproof by folding the edge several times and fastening it with paper clips.

⁷ See footnote 5.

STORING

Dates turn dark with age, become sirupy, and lose their fresh flavor. Uncured fruit is apt to mold and sour. The sugar of invert-sugar dates crystallizes at times, forming "sugar spots" under the skin, but this condition does not make the fruit inedible. In commercial practice, dates are held in cold storage for many months without deteriorating, but without refrigeration only cured fruit can be kept longer than a few weeks.

Under home conditions dates should be stored in a cool, dry place to insure minimum deterioration. The fruit having the most moisture has the shortest storage life and should be used first. Uncured dates can be kept for several weeks in a household refrigerator. Dates held in ventilated containers in electric refrigerators will dry out slowly, whereas if they are held in ice refrigerators they will absorb moisture and may eventually become sirupy.

FOOD VALUE

The composition of dates varies and appears to depend somewhat upon variety, ripeness, and age of the fruit. The weight of moisture in the flesh of uncured fruit is about 30 percent and of dry fruit is about 15 percent. Cured dates, having a moisture content of 20 percent, contain about 2 percent each of protein, fat, and mineral matter. Carbohydrate totals about 74 percent; it is chiefly sugar, but about 2.5 percent of fiber and some undetermined constituents are included in this portion. The sugars alone amount to 60 to 65 percent. At this composition, dates furnish about 1,460 calories per pound. Like other foods that contain so much sugar, dates classify as an energy food. They are useful, therefore, in rounding out the calorie needs for the day. In addition they contribute minerals and vitamins to the diet.

The mineral matter, or ash, is made up of various elements, including such nutritionally important ones as calcium, phosphorus, iron, and copper. Diets may be low in the first three of these minerals unless foods furnishing adequate amounts of them are included. It is significant, therefore, that the iron content of dates is high enough that they rate as a good source of this mineral; they are, in addition, a fair source of calcium. Although they contribute some phosphorus, they are poor in this constituent. The amount of copper in any food is exceedingly small, but, as foods go, dates rate as a good source of this element.

Studies on the vitamin content of dates indicate that they are a fair source of vitamin A and of thiamin (vitamin B₁); apparently, they furnish only negligible quantities of the other vitamins.

Apart from the pleasing variety that dates offer to the diet, it may be said that they justify their inclusion on the grounds that they furnish certain valuable minerals and vitamins in addition to an ample supply of calories.

Dry dates, including the fruit of varieties other than bread dates that have become very dry, are used as whole fruit or are pitted and then ground in a food chopper to a thick paste or a coarse meal, depending on the dryness of the fruit. This product can be stored

in lidded jars after being fumigated or heated (to kill insect eggs) and used as a substitute for sugar. Date sirup can be prepared as follows:⁸ The dates are washed and allowed to soak overnight. In the morning the pits are removed and the fruit is boiled till soft, more water being added as needed. The fruit is then mashed, the juice is allowed to drain through a muslin sack, and is then boiled down to any desired thickness. The sirup can be stored in bottles or other desirable containers and used on the table or for cooking.

SUMMARY

This circular contains information on the handling of small lots of dates by methods and inexpensive equipment that are available or can be provided in the home.

It is sometimes desirable to harvest mature dates before they are soft-ripe and cured, particularly of varieties whose fruit drops readily from the palm; it may also be desirable in order to prevent injury by birds, or when there is a probability of rain.

Dates should be cleaned at least twice; once immediately after picking, in order to facilitate grading the fruit, and again before fumigating, ripening, and packing. Methods for doing the cleaning are described.

Small lots of mature but firm dates can be softened and cured under separate heat and drying treatments with simple equipment, although considerable time and attention are required to grade the fruit properly and place each grade under the most favorable conditions of heat and humidity.

Home-made equipment is described, including grading table, cleaner, and cabinets for ripening, curing, and fumigating the fruit.

Dates of low moisture content may be packed in nonventilated containers, preferably of tin or glass; in such containers they will remain in good condition for several months if kept reasonably cool.

Uncured fruit is perishable because of high moisture content and will mold or sour unless held under refrigeration. If dates of high moisture content are stored they should be packed in well-ventilated and screened containers to facilitate drying and to exclude insects.

Dry dates can be softened in moist air or ground into a paste, a coarse meal, or made into sirup. Dates are classed as an alkaline food containing considerable quantities of potassium, calcium, phosphorus, copper, iron, and vitamins A, B₁, and G.

⁸ METZLER, MAY SOWLES, compiler. DATE COOK BOOK; INTERNATIONAL FESTIVAL OF DATES. Souvenir ed., 83 pp. [Coachella, Calif. 1921.]

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